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/* A generic PBPK Models adapted from Woodrow Setzer's code for deltamethrin
   by John Wambaugh May 11 2011 */
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```
#include <R.h>
#include <Rinternals.h>
#include <R_ext/Rdynload.h>
#include "vliverpbpk.h"
```

```
/* get the list element named str, or return NULL */
SEXP getListElement(SEXP list, char *str)
{
  SEXP elmt= R_NilValue, names = getAttrib(list, R_NamesSymbol);
  int i;

  for (i = 0; i < length(list); i++)
    if(strcmp(CHAR(STRING_ELT(names, i)), str) == 0) {
      elmt = VECTOR_ELT(list, i);
      break;
    }
  return elmt;
}
```

```
//
// CHANGE NAME OF THIS FUNCTION ONLY:
//
```

```
/* initializer */
void vliver_pbpk_init(void(* odeparms)(int *, double *))
{
  int Nparms, i;
  DL_FUNC get_deSolve_gparms;
  SEXP gparms, tmp, dim;
  get_deSolve_gparms = R_GetCCallable("deSolve","get_deSolve_gparms");
  gparms = get_deSolve_gparms();
  Nparms = LENGTH(gparms);
  if (Nparms != N_PARMS) {
    PROBLEM "Confusion over the length of parms"
    ERROR;
  } else {
    for (i=0; i < N_PARMS; i++) {
      // Rprintf("\n-- %s --\n",_RDy_parms[i].name);
      tmp = getListElement(gparms, _RDy_parms[i].name);
      if (!isNull(tmp)) {
        _RDy_parms[i].value = REAL(tmp);
        //Rprintf(".. value: %f\n",_RDy_parms[i].value[0]);
        dim = getAttrib(tmp,R_DimSymbol);
        if (!isNull(dim)) {
          //Rprintf("getting dim\n");
          _RDy_parms[i].dim = INTEGER(dim);
        }
      }
    }
  }
}
```

```

//
// MUST CHANGE THIS FUNCTION:
//

void v_liver_pbpk_derivs(int *neq, double *t, double *_RDy_vliver_pbpk_state, double
*_RDy_vliver_pbpk_ydot, double *_RDy_vliver_pbpk_extras, int *ip)
{
    if (UseAmounts)
    {
        Cgut = Cgut / Vgut;
        Clung = Clung / Vlung;
        Cart = Cart / Vart;
        Cderm = Cderm / Vderm;
        Cven = Cven / Vven;
        Crest = Crest / Vrest;
        Cliver = Cliver / Vliver;
        Ckidney = Ckidney / Vkidney;
    }

    // Variable names defined in pfoa_models.h

    Ratioblood2plasma = 1 - hematocrit + hematocrit*Krbc2plasma*Fraction_unbound_plasma;

    // AMOUNT REMAINING AT ABSORPTION SITE (GUT)(micromol)
    Agutlumen_dot = -kgutabs*Agutlumen;

    // Change wrt of concentration of PFOA (micromol/L) in the gut tissue:
    Cgut_dot = (Qgut*(Cart-Cgut)+kgutabs*Agutlumen)/Vgut;

    // Change wrt of concentration of PFOA (micromol/L) in the gut tissue:
    Clung_dot = (Qcardiac*(Cven-Clung)+kinhabs*Cair)/Vlung;

    Cart_dot = Qcardiac*(Clung- Cart)/Vart;

    Cderm_dot = (Qderm*(Cart - Cderm*Ratioblood2plasma/Kderm2plasma/Fraction_unbound_plasma) +
kdermabs*Ccontact)/Vderm;

    Cven_dot = (Qderm*Cderm*Ratioblood2plasma/Kderm2plasma/Fraction_unbound_plasma +
(Qliver+Qgut)*Cliver*Ratioblood2plasma/Kliver2plasma/Fraction_unbound_plasma +
Qkidney*Ckidney*Ratioblood2plasma/Kkidney2plasma/Fraction_unbound_plasma +
Qrest*Crest*Ratioblood2plasma/Krest2plasma/Fraction_unbound_plasma -
Qcardiac*Cven)/Vven;

    // Change wrt of concentration of PFOA (micromol/L) in blood of rest of body:
    Crest_dot = Qrest*(Cart- Crest*Ratioblood2plasma/Krest2plasma/Fraction_unbound_plasma)/Vrest;

    // Change wrt of concentration of unbound PFOA (micromol/L) in the liver:
    Cliver_dot =
    (Qliver*Cart
    - CLbiliary*Cliver/Kliver2plasma/Fraction_unbound_plasma
    - CLmetabolism*Cliver/Kliver2plasma/Fraction_unbound_plasma
    + Qgut*Cgut
    - (Qliver+Qgut)*Cliver*Ratioblood2plasma/Kliver2plasma/Fraction_unbound_plasma)/Vliver;
    // }

    // Change wrt of concentration of PFOA (micromol/L) in the blood in the kidney:

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```

Ckidney_dot = (Qkidney*Cart // inflow
- Qgfr*Ckidney/Kkidney2plasma // GFR to tubules
- Qkidney*Ckidney*Ratioblood2plasma/Kkidney2plasma/Fraction_unbound_plasma // blood from other
minus outflow
)/Vkidney;

if (UseAmounts)
{
  Cgut_dot = Cgut_dot * Vgut;
  Clung_dot = Clung_dot * Vlung;
  Cart_dot = Cart_dot * Vart;
  Cderm_dot = Cderm_dot * Vderm;
  Cven_dot = Cven_dot * Vven;
  Crest_dot = Crest_dot * Vrest;
  Cliver_dot = Cliver_dot * Vliver;
  Ckidney_dot = Ckidney_dot * Vkidney;
  Cgut = Cgut * Vgut;
  Clung = Clung * Vlung;
  Cart = Cart * Vart;
  Cderm = Cderm * Vderm;
  Cven = Cven * Vven;
  Crest = Crest * Vrest;
  Cliver = Cliver * Vliver;
  Ckidney = Ckidney * Vkidney;
}
}

```